

REMARKS

Applicants appreciate the thorough examination of the present application as evidenced by the Office Action. Applicants note that various clerical amendments have been made to the claims above as well as the amendments discussed in the substantive arguments section below. Applicants submit that the present rejections should be withdrawn for at least the reasons discussed below.

The Section 112 Rejections

Claims 14-31 stand rejected under 35 U.S.C. § 112 as indefinite based on the recitation "forming a reaction-preventing nitride layer to prevent oxidation at a temperature not generating a phase change." Office Action, p. 3. Independent Claims 14 and 24 have been amended above to address the Examiner's concern. Accordingly, Applicants submit the Section 112 rejections of Claims 14-31 should be withdrawn as obviated.

The Independent Claims Are Patentable

Claims 1-3, 5, 7-11, 14-16, 18 and 20-33 are identified as standing rejected under 35 U.S.C. § 102(b) as anticipated by United States Patent No. 6,784,100 to Oh *et al.* (hereinafter "Oh"). Office Action, p. 4. Claims 4, 17, 6, 19 and 12-13 stand rejected as obvious under 35 U.S.C. § 103 over Oh alone or in combination with United States Patent Publication No. 2003/0134486 to Wang (hereinafter "Wang") or United States Patent No. 5,340,765 to Dennison *et al.* (hereinafter "Dennison").

Independent Claims 1, 14, 24, 32 and 33 have been amended above to recite that the dielectric layer is formed at about or below a specified temperature (variously recited as 600°C, not generating a phase change of the underlying conductive layer, or below a minimum temperature associated with a phase change of the lower electrode) and to recite that the electrode/conductive layer and the protection layer are not exposed to a higher temperature before formation of the dielectric layer.

The added recitations are discussed in the present specification, for example, at page 10, lines 26-29. As stated in the specification:

In some embodiments of the present invention, the metal oxide layer formed as the dielectric layer is **not a Ta₂O₅ layer because** a crystallization and heat treatment should generally be applied at about **600°C or over after forming a Ta₂O₅ layer.**

Specification, p. 10, lines 26-29 (emphasis added). In contrast, Oh describes formation of a tantalum oxide layer 27 between the second silicon nitride layer 26 and the titanium nitride layer 28. As stated in Oh:

the step 37 of performing the thermal process is carried out in order to crystallize the tantalum oxide layer and reduce an impurity and an oxygen depletion. Here, the thermal process is performed at an N₂O or O₂ atmosphere and at a temperature of 600°C. to 900°C. so as to crystallize the tantalum oxide layer 27, remove an impurity such carbon and compensate for the oxygen depletion.

Oh, Col. 5, lines 54-58.

Thus, Oh fails to disclose the methods of the present independent claims as it, in fact, teaches away from the claimed method in that a tantalum oxide layer is formed on the nitride layer and then exposed to high temperatures. Accordingly, the rejections of all the independent claims should be withdrawn for at least these reasons.

The Dependent Claims are Patentable

The dependent claims are patentable at least based upon the patentability of the independent claims from which they depend. Various of the dependent claims are also separately patentable. For example, Claim 5 recites a chemical vapor deposition and/or atomic layer deposition process at a temperature of about 600°C or less. The Office Action, in rejecting Claim 5 recites a portion of Oh that relates to the second nitride layer 26 of Oh, which is deposited on the first nitride layer 25, not on the polysilicon layer (lower electrode) 24. Office Action, p. 5. Thus, Oh does not disclose protection layer deposited directly on the lower electrode as recited in Claim 5 as amended. Accordingly, Claim 5 is separately patentable for at least these additional reasons.

In rejecting Claims 4 and 17, the Office Action relies on a rapid thermal nitration embodiment described in Oh for temperatures being allegedly obvious for a different

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embodiment of Oh. Office Action, pp. 7-8. However, as Oh itself does not suggest the temperatures of one embodiment should be used in alternative embodiments, Applicants submit that the rejection fails to provide a particular motivation in the cited reference for modifying the teachings of the reference to arrive at the present invention as recited in Claims 4 and 17. Accordingly, Claims 4 and 17 are separately patentable for at least these reasons.

CONCLUSION

Applicants respectfully submit that, for the reasons discussed above, the references cited in the present rejections do not disclose or suggest the present invention as claimed. Accordingly, Applicants respectfully request allowance of all the pending claims and passing this application to issue.

Respectfully submitted,

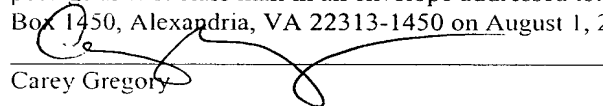

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